

STUDIES ON THE LEAF-MINING SAWFLIES OF THE TRIBE  
FENUSINI IN ASIA (HYMENOPTERA: TENTHREDINIDAE)

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*Abstract.*—The following new taxa are proposed in the Fenusini: *Ana-fenusa shinoharai*, n. sp. from Japan; *Birmella taiwanensis*, n. sp. from Taiwan; *Metallus nepalensis*, n. sp. from Nepal; *M. satoi*, n. sp. from Korea; and *Okutanius lobatus*, n. gen., n. sp. from Korea. Each represents new records for the respective genera from each country. Notes on hosts and new localities for other Fenusini are also given.

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The Fenusini, all leaf miners in the larval stage, are very small, dark-colored, and are not commonly collected. Because of the scarcity of specimens, the fauna of Asia is not well known. I examined some specimens from Asia, and present information here on new hosts and records, and describe five new species and one new genus. These data represent additions to my treatment of the world genera of Fenusini (Smith, 1976), and the genera discussed here may be identified by using the key to genera in the same paper. The species from Japan are not treated in full; Togashi (1980) gave a key to genera of Fenusini for Japan, but accumulation of the material available in collections in Japan is necessary for a revision of the Fenusini for that country, and some genera are currently being studied by Japanese workers.

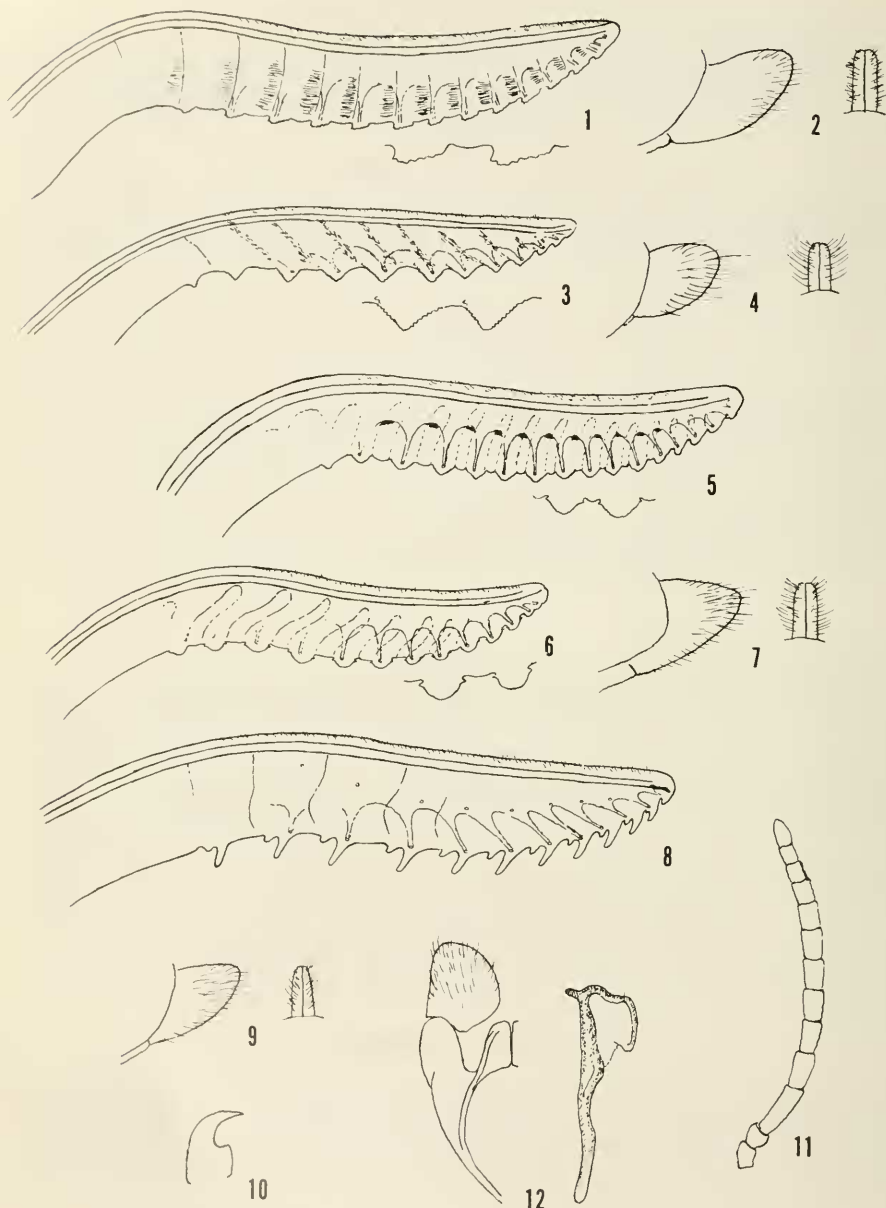
*Ana-fenusa* Benson

Two species have been described; *javana* (Enslin) from Indonesia (Java) and *impropria* (Malaise) from Sedanka (near Vladivostok), USSR. The following species represents the first record of this genus from Japan; the host is the first recorded for the genus.

*Ana-fenusa shinoharai* Smith, NEW SPECIES

Figs. 1, 2

Female.—Length, 3.2–3.7 mm. Black with palpi, extreme apex of each femur, all tibiae, and all tarsi white; labrum whitish to brown; abdominal



Figs. 1-2, *Anafenusia shinoharai*. 1, Lancet. 2, Sheath. Figs. 3-4, *Birmella taiwanensis*. 3, Lancet. 4, Sheath. Fig. 5, *Metallus nepalensis*, lancet. Figs. 6-7, *M. satoi*. 6, Lancet. 7, Sheath. Figs. 8-11, *Okutanius lobatus*. 8, Lancet. 9, Sheath. 10, Tarsal claw. 11, Antenna. Fig. 12, *Birmella taiwanensis*, male genitalia, capsule, ventral; valve, lateral. Sheaths shown in lateral view on left and dorsal view on right.

terga brownish, paler than black thorax. Wing subhyaline, little darker at base; veins dark brown, stigma paler brown. Antenna  $1\frac{1}{4}\times$  head width; 9-segmented; 1st and 2nd segments each longer than broad; 3rd segment  $1\frac{1}{2}\times$  length of 4th segment; segments 4–9 gradually decreasing in length and each only slightly longer than broad. Clypeus truncate; malar space narrow, less than  $\frac{1}{2}$  diameter of an ocellus; postocellar area convex, slightly elevated above surrounding area on head,  $1\frac{1}{3}\times$  broader than long; distance between eyes below greater than eye length; no genal carina. Prepectus absent. Tarsal claw simple; hindbasitarsus equal to length of following 3 segments combined; foretarsus equal in length to foretibia. Forewing with radial cell closed; vein 2A + 3A straight; 1st cubital crossvein indicated but faint, therefore wing with 4 cubital cells. Hindwing with radial cell open; anal cell present. Sheath (Fig. 2) slender, rounded at apex in lateral view. Lancet (Fig. 1) with serrulae low, each with 5–6 coarse posterior subbasal teeth.

Male.—Unknown.

Holotype.—Female, "larva coll. Hirao, Nagano, 10-VII-1932, K. Sato," "bred with *Ulmus* sp. (leaf miner)," "Emerg. Yokohama, 30-III-33," "166." In the National Science Museum (Natural History), Tokyo.

Paratype.—Same data as for holotype (1♀). Deposited with holotype.

Remarks.—The following separates *shinoharai* from *impropria*: Vein M of forewing arcuately curved (nearly straight in *impropria*); hindtibia and tarsi white (brownish at apices in *impropria*); subcosta brown, a little paler toward stigma (yellow in *impropria*); malar space indicated (linear in *impropria*); and sheath broader and more rounded (narrower in *impropria*). *Anafenusa javana* has black legs, and 10-segmented antennae, neither of which agree with *shinoharai*.

The species is named for Mr. Akihiko Shinohara, a student of sawflies at the University of Osaka Prefecture.

### *Birmella* Malaise

The following species represents the first record of *Birmella* outside of Burma and the first record of a member of the Fenusini from Taiwan.

#### *Birmella taiwanensis* Smith, NEW SPECIES

Figs. 3, 4, 12

Female.—Length, 3.3 mm. Black with following pale orange: 1st and 2nd antennal segments; palpi; tegula; basal 4 terga and sterna; and legs except for blackish apical tarsal segments. Wings subhyaline; veins and stigma black. Antennal length  $1\frac{1}{3}\times$  head width; 10-segmented; 1st and 2nd segments each longer than broad, cylindrical; 3rd segment  $1\frac{1}{3}\times$  length of 4th segment; segments 4–10 gradually decreasing in length; apical 4 segments

each  $1\frac{1}{2}\times$  or more longer than broad. Clypeus truncate; malar space linear; postocellar area  $1\frac{1}{3}\times$  broader than long; supraclypeal furrow deep and sharply separating clypeus and supraclypeal area; distance between eyes below shorter than eye length; no genal carina. Prepectus absent. Tarsal claw simple; foretarsus  $1\frac{1}{2}\times$  length of foretibia; hindbasitarsus equal to length of 3 following tarsal segments combined; 4th tarsal segment produced below 5th segment. Basal plates emarginated behind, leaving large membranous area. Forewing with radial cell closed; vein 2A + 3A curved upward and meeting 1A. Hindwing with radial cell open; anal cell absent. Sheath (Fig. 4) short and rounded in lateral view. Lancet (Fig. 3) with rather deep, pointed serrulae, each with 7–10 fine anterior and 7–10 fine posterior subbasal teeth.

Male.—Length, 2.4–2.8 mm. Similar in structure and color to female except tegula black; basal terga more brownish than orange; and hindtarsus mostly blackish. Genitalia in Fig. 12.

Holotype.—Female, "Arisan, Taiwan, May 27, 1929, coll. K. Sato," "Taiwan 57, 393." In the National Science Museum (Natural History), Tokyo. Arisan (Alishan in Chinese) is a mountain (ca. 2400 m) in Chia Pref., west of Mt. Yushan, the highest mountain in Taiwan.

Paratypes.—Labeled "Baibara, Formosa, IV-25-1929, coll. K. Sato" (3♂). Deposited with holotype. Baibara is north of Puli, Nantou Pref., in central Taiwan.

Remarks.—The following key will separate *taiwanensis* from the two known species of *Birmella* from Burma:

1. Malar space as long as diameter of an ocellus in female, more than  $\frac{1}{2}$  as long in male (black with legs and palpi yellowish; clypeus truncate; supraclypeal furrow deep) ..... *truncata* Malaise
- Malar space linear ..... 2
2. Black with legs and palpi yellow; clypeus with shallow, angular emargination; supraclypeal furrow shallow, indistinct .. *genalis* Malaise
- Black with 1st and 2nd antennal segments, palpi, tegula in female, basal 4 terga and sterna, and legs pale orange; clypeus truncate; supraclypeal furrow deep, distinct ..... *taiwanensis*, new species

#### *Fenusa* Leach

*Fenusa dohrnii* (Tischbein).—This species was recorded from Japan by Togashi (1963), Okutani (1967) on *Alnus japonica* Steud., and Togashi (1972) on *Alnus fauriei* Kev. It is a leaf miner of *Alnus* throughout the Holarctic Region. I have seen specimens from Hokkaido on *Alnus japonica*; Yokohama, Kanagawa-ken, 10-V-1933, K. Sato; and Shikotan, Kuriles.

*Fenusa pusilla* (Lepelletier).—Records for Japan were given by Togashi

(1960) on *Betula*, Inoue (1963) on *Betula platyphylla* Sukatchev var. *japonica* (Miq.) Hara in Hokkaido with life history notes, Okutani (1967) on *Betula platyphylla* var. *japonica*, *B. verrucosa* Ehrh., and *B. populifolia* Marsh., and Togashi (1976) on *Betula ermanii* Cham. This Holarctic species is a serious pest of birch in North America.

*Fenusa ulmi* Sundevall.—I saw one specimen from "Sounkyo, Hokkaido, VI-19-1938, coll. K. Sato." This is the first record of this elm leaf miner from Japan; it is also found in Europe and is adventive in North America.

#### *Messa* Leach

*Messa nana* (Klug).—A specimen at Hokkaido University is from Hokkaido and bears a host label "*Betula platyphylla* var. *japonica*." This is the first record of this species from Japan; it occurs in Europe, and it has been introduced into the northeastern United States and eastern Canada where it is also a leaf miner of *Betula*.

#### *Metallus* Forbes

Takeuchi (1952), Togashi (1963, 1978), and Okutani (1967) recorded *Metallus albipes* (Cameron) from Japan, and Okutani (1970) recorded *M. pumilus* (Klug) from Japan. Both are European species. Okutani (1967, 1970) recorded the hosts of both species as *Rubus crataegifolius* Bunge. The only other described species from Asia is *M. compressicornis* (Malaise) from Burma. The following species from Korea and Nepal are new.

#### *Metallus satoi* Smith, NEW SPECIES

Figs. 6, 7

Female.—Length, 4.0 mm. Black with palpi, extreme apex of each femur, and all tibiae and all tarsi white. Wings subhyaline; veins brown, costa and stigma paler brown. Antennal length  $1\frac{1}{2}$  × head width; 9-segmented; 1st and 2nd segments each broader than long; 3rd segment  $1\frac{1}{3}$  × length of 4th segment; segments 4–9 gradually decreasing in length and each about 2 × longer than broad. Clypeus truncate; malar space linear; postocellar area  $1\frac{2}{3}$  × broader than long; distance between eyes below greater than eye length; no genal carina. Prepectus absent. Tarsal claw with one tooth and broad, acute basal lobe; hindbasitarsus equal to length of 3 following segments combined; foretarsus slightly longer than foretibia. Forewing with radial cell closed; vein 2A + 3A straight; 1st cubital crossvein very faint, thus appearing to have 3 cubital cells. Hindwing with radial cell closed, though veins faint at apex; anal cell present. Sheath (Fig. 7) rounded at apex in lateral view. Lancet (Fig. 6) with serrulae rounded, far apart, each broader than long and with small subbasal tooth at base on anterior and posterior sides.

Male.—Unknown.

Holotype.—Female, "Shakuoji, Korea, VII-22-1931, coll. K. Sato." In the National Science Museum (Natural History), Tokyo. Shakuoji, Korea, may be Seogwang-sa, a temple in a mountainous area, about 39°N, southwest of Weonsan in Hamgyeongnam-Do near the border of Gangweon-Do (A. Shinohara, personal communication).

Remarks.—The coloration of *satoi* is identical to that of *pumilus* (Klug) from Europe; however, the following separates *satoi* from *pumilus* and other species of *Metallus*: lancet serrulae low, rounded, broader than long (serrulae long, as long as broad in *pumilus*, *geei* (Brischke), and *albipes*; more pointed than rounded at their apices, and no posterior subbasal tooth near the base *geei*), and far apart (close together in *nepalensis*, Fig. 5); sheath narrower in lateral view (more broadly rounded in the three European species); clypeus truncate (very shallow V-shaped emargination in some other species); third antennal segment longer than fourth segment (subequal in length in all other species); malar space linear (short but distinct in other species); and femora black (white in *geei* and *albipes*).

The species is named after the collector.

#### *Metallus nepalensis* Smith, NEW SPECIES

##### Fig. 5

Female.—Length, 3.6 mm. Black with 1st and 2nd antennal segments and palpi white; legs white with basal  $\frac{2}{3}$  of forecoxa, extreme bases of mid- and hindcoxae, and basal  $\frac{2}{3}$  of forefemur black. Wings subhyaline; veins and stigma dark brown to black. Antennal length 2× head width; 9-segmented; 1st and 2nd segments each broader than long; segments 3–5 subequal in length; segments 6–9 gradually decreasing in length and each slightly more than 2× longer than broad. Clypeus very shallowly, circularly concave on anterior margin; malar space very narrow to linear; postocellar area 2× broader than long; distance between eyes below greater than eye length; no genal carina. Prepectus absent. Tarsal claw with long tooth and broad, acute basal lobe; hindbasitarsus equal in length to following 3 segments combined; foretarsus longer than foretibia. Forewing with radial cell closed; vein 2A + 3A straight; 1st cubital crossvein absent, therefore with 3 cubital cells. Hindwing with radial cell closed; anal cell present. Sheath (as in Fig. 7) slender, in lateral view rounded at apex. Lancet (Fig. 5) with serrulae low, close together, rounded, each broader than long, and with small indistinct subbasal tooth near base on anterior and posterior sides.

Male.—Unknown.

Holotype.—Female, "Nepal, Kmd., Godav ari, 6000', 14-17-VII-1967, Mal. Tr., Can. Exp." In the Canadian National Collection, Ottawa.

Remarks.—The following separates *nepalensis* from *compressicornis* from Burma: basal antennal segments white; mid- and hindfemora white; presence of three cubital cells in the forewing, and the circularly concave

anterior margin of the clypeus. The lancet serrulae are broader than long and close together (far apart and as long or longer than broad in *pumilus*, *geei*, and *albipes*; similar in *satoi* but far apart). The white mid- and hindfemora separate *nepalensis* from *pumilus* and *satoi*; the black forefemora and concave anterior margin of the clypeus separate *nepalensis* from *albipes* and *geei*, and, in addition, the apical antennal segments which are more than two times longer than broad separate *nepalensis* from *geei* which has those segments about one and one-half times broader than long.

#### *Okutanius* Smith, NEW GENUS

Type-species.—*Okutanius lobatus* Smith, new species.

Antenna 13-segmented; 1st and 2nd segments each as broad or broader than long; 3rd segment longer than 4th segment; segments 4–13 subequal in length (Fig. 11). Prepectus present, separated from mesepisternum by furrow. No genal carina. Tarsal claw simple with small basal lobe (Fig. 10). Forewing with radial cell closed; vein 2A + 3A straight; 1st cubital crossvein faint, therefore with 4 cubital cells. Hindwing with radial cell open; without anal cell.

Remarks.—The presence of a prepectus and a basal lobe on the tarsal claws takes *Okutanius* to the couplet separating *Parna* and *Nefusa* in my key to genera (Smith, 1976). *Parna*, however, has a genal carina, a closed radial cell in the hindwing, and an anal cell in the hindwing; both *Nefusa* and *Parna* have 9-segmented antennae with the second segment longer than broad, a broad, acute basal lobe on the tarsal claws, and an anal cell in the hindwing.

The genus is named for Professor Teiichi Okutani, Kobe University, Kobe, Japan; genus gender, masculine.

#### *Okutanius lobatus* Smith, NEW SPECIES

Figs. 8–11

Female.—Length, 4.0 mm. Black with 1st and 2nd antennal segments and labrum brown; palpi whitish; legs yellowish white with basal  $\frac{1}{2}$  of each coxa black; basal 6 terga brownish, paler than black thorax. Wings subhyaline; veins brown, stigma paler brown. Clypeus truncate; malar space linear; postocellar area  $2\times$  broader than long; distance between eyes below greater than eye length. Antenna with 1st segment as broad as long; 2nd segment broader than long; 3rd segment  $1\frac{1}{2}\times$  length of 4th segment; 4th segment longer than broad; segments 5–13 subequal in length and slightly longer than or about as long as broad. Hindbasitarsus equal to length of following 3 segments combined; foretarsus slightly longer than foretibia. Head and body smooth and shining. Sheath (Fig. 9) rounded in lateral view. Lancet (Fig. 8) with long, narrow lobelike serrulae alternating with short lobelike serrulae about  $\frac{1}{2}$  or less the length of long ones.

Male.—Unknown.

Holotype.—Female, "Suigen, Chosen, Sept. 5, 1928, coll. K. Sato." "373." In the National Science Museum (Natural History), Tokyo. The type-locality is now known as Suweon, Korea.

Remarks.—The generic and specific characters noted including the unusual lancet (Fig. 8) should distinguish *lobatus*. The name is derived from the serrulae of the lancet.

#### *Parna* Benson

*Parna kamijoi* Togashi.—Togashi (1980) recently recorded this genus from Japan. Several specimens from Sapporo with the host label "*Tilia maximowiziana*," the same host Togashi reported, are at Hokkaido University. Another specimen at the National Science Museum, Tokyo, is from Sapporo, I-VI-1930, S. Fujii. *Parna tenella* (Klug), the only other species in the genus, occurs in Europe and Japan and is also a leaf miner of *Tilia*.

#### *Profenusa* MacGillivray

I have seen several species from Hokkaido and Honshu. The genus is currently being revised by I. Togashi, Ishikawa Prefecture College of Agriculture. Togashi (1960, 1963) has recorded *Profenusa thomsoni* (Konow), a leaf miner of *Betula*, in Japan.

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